

## Lions in India – A question of survival

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A question uppermost in the mind of a conservationist who is anxious for the survival of lions in India should be whether there is any necessity of keeping Asiatic lions (*Panthera leo persica*) and their Afro-Asian hybrids sequestered in zoos on the grounds of maintaining purity of genes. Will a thorough scientific study of the morphology, morphometry, osteology and genetic attributes and animal behaviour necessarily lead to the conclusion that dissimilarities between the two so-called sub-species outnumber the similarities between them? The answer should be in the negative. It is often pointed out that the Asiatic lion has a smaller mane and a tendency to have a ventral skin fold, is slightly smaller in size and lives in smaller prides. Some have also gone to the extent of asserting that when considering its history and phylogeny, it must be considered an evolutionary significant unit, almost certainly on its way to becoming a distinct species.

It appears, the logic of speciation is not correct here. A narrow taxonomical perspective based on minor differences seems responsible for sequestration of hybrids. These minor differences and geographical isolation, on closer study, can be found to be inadequate to justify such separation and to wedge apart the lions into different sub-species. For one thing, reproductive isolation is conspicuously absent in the African lions and their Indian counterparts. Most of their progeny have proved to be healthy and fertile. For another, the differences pointed out are minor phenotypic and behavioural ones, which however are produced by evolutionary changes in gene expression. Epigenetic differences arise even in monozygotic twins. Thirdly, one should also take note of the similarity in the karyotypes of the two populations. Fourthly, merging of phenotypic traits inherited from the parents in successive generations F1, F2, F3 and so on of the hybrids makes it difficult even for experienced zookeepers to make out the differences by appearance. This shows that the rate of evolution in lions is minimal and slower than what is assumed to be in geographically isolated populations.

For a conservationist what is important is to conserve the species as a whole rather

than keeping them reproductively isolated as sub-species on the basis of marginal differences. It is not suggested here that two distant species should be allowed to cross-breed, resulting in loss of biodiversity. What is emphasized is the necessity of re-examining the definition of sub-species, which forcibly keeps two populations of the same species reproductively isolated on the basis of superficial differences and isolation of the habitat. There is an increasing tendency for taxonomists in general to divide a sibling species into sub-species and not unite them if required. Take, for example, the swamp deer in India (*Cervus duvaucelli*). At present there are three sub-species differentiated on the basis of minor phenotypic and habitat differences. If these three populations are allowed to mix, much of the danger surrounding their survival can be averted. All this redounds to the conclusion that there has to be a paradigm shift in speciation and sub-structuring.

Chances of survival of the species as a whole and genetic variability within the population are enhanced by hybridization. Introgression of genes will accelerate recombination and the genes will be differentially regulated according to newly evolving surroundings. The surplus hybrid lions in Indian zoos exemplify this. Even though heterosis is not invariably found in successive generations of all the animal groups, most of the hybrid lions are found to be healthy and well-adapted. This means, our concern should only be to maintain an optimum level or a proper balance between inbreeding and outbreeding of different populations of lions in general.

In fact, hybrids began to come into being in India mainly because African lions inducted by circuses and leading a pathetic life in small cages were confiscated and confined by the Indian authorities in various zoos, where they inadvertently hybridized with captive Asiatic lions. Captive lions with around 600 individuals outnumber the lions in the wild in Gir forest in Gujarat totalling 359 in number. The majority of these captive individuals, except in Chhatbir zoo, Punjab, where some individuals have been found to be ailing from certain neurological problems,

is reported to be hybrids that continue to breed well and remain well-adapted to Indian conditions as is evident from the data now available with the Central Zoo Authority. Neurological problems need not necessarily be due to hybridization. Such problems are observed even among direct descendants of Asiatic lions from Gir forest, kept at Sakkarbaugh zoo in Gujarat as well. On the other hand, the strenuous efforts to propagate Gir lions in captivity or in zoos yield not so encouraging results. Now the question is: will the growing numbers of the captive lions become burdensome to the authorities? Statistics indicates that approximately Rs 60 million is spent annually on the upkeep of all the lions, which includes hybrids and pure Indian lions in zoos.

Surplus lions could be introduced into selected sanctuaries, say at Kuno in Madhya Pradesh or Chandraprabha in Uttar Pradesh along with habitat restoration programmes. It has been pointed out that there remains a technical snag that a new introduction of hybrids may not be permissible under IUCN guidelines, which were framed for re-introduction programmes. Moreover, they do not consider the hybrid lions as endangered or threatened species. As pointed out above, the authorities should start treating these animals as intra-specific hybrids of two distant populations, which still retain close affinities, in the larger interest of the efficient management of the teeming lions. Apart from this, merging of phenotypic traits inherited from the parents in successive generations of hybrids shows that the rate of evolution is minimal and slower than what is assumed to be, especially in these geographically isolated lion populations. Otherwise, their separation may not be as old as thought to be in the time-scale. The release of the lions into new sanctuaries could be in a phased manner, monitoring the released animals. However, it must be concluded that once experimentally released into the wild, the question whether they will freely intermix and form mixed prides mingling with the Asiatic lions is yet to be ascertained on empirical facts. If they do, one can categorically conclude that geographical separation has not led to the formation of a so-called sub-species. What

is therefore required now is the urgent introduction of the hybrid population, which is already having a wider gene pool than their ancestral groups did, into a new sanctuary as an experimental group along with a habitat restoration programme to be strictly monitored at least in the initial stages.

One may note that another sanctuary is proposed with the contingency of excess numbers in zoos in mind. There is no scope for fear that their numbers will overshoot in the wild, because the natural phenomenon of environmental resistance will increase alongside population size, and the latter will drop back as it nears the carrying capacity. In the zoos, contraception methods could be utilized in the eventuality of excess growth of numbers among the individuals of the remainder left behind. In the wild, lions can survive by predation. Yet at present, their numbers are far less than the optimum that our forests can sustain. In zoos maintenance of big carnivores is questioned sometimes from the point of view of the ethical dilemma of killing some animals to feed others. As pointed out above, lions kill to survive. This natural right of the carnivores is not lost simply by reason of their captivity in zoos. Domestic animals which profusely breed and multiply in farms and which are common should be given less importance than the critically endangered tertiary level of

carnivores, which must be conserved at any cost.

There has been a suggestion from some quarters that hybrids should be culled away. One can never support culling healthy and genetically appropriate lions. Culling of healthy animals which have come into existence because of man's activism is not appreciated all over India, where the lion is an object of worship and forms part of mythology, folklore and the state currency. Even if genetically inappropriate and sterile inter-specific hybrid animals like ligons or tignons were to come into being by wrong breeding practices in zoos, the idea of culling would still be abhorrent to the Indian ethos and they would be magnanimously allowed to complete their lifetimes. Coming to individuals stricken down with incurable illness in Indian zoos, euthanasia is resorted to in order to put an end to the suffering. A total extermination of the hybrids, if suggested is a horrible, unscientific proposition, to say the least.

According to some assumptions, conservation of biodiversity rules out man's intervention, and the purity of African lions and Asiatic lions should be left untouched. But there have been several instances in which man has intervened to preserve the gene pool. It has been reported that when natural hybridization was widespread, the US authorities intervened in order to save the red wolf, even

as their hybrids were brought under conservation programme. Also natural calamities like floods, droughts and wild fires have prompted man to intervene to protect endangered animals, as has been the case in Northeast India, where artificial mounds are built during monsoons so that wild animals, including rhinos might take shelter from the rising waters of the River Brahmaputra. When fragmentation of habitats took place, the Government took the initiative to build forest corridors linking different segments together, thus facilitating conspecific hybridization. Man's intervention in nature, an inevitable feature of his struggle for survival, is a fait accompli and it is futile to shy away from it at this point of time when conservation of animal populations is at stake.

Despite the fact that among human populations there are marked differences in phenotype, genotype and behavioural patterns across the continents, they have not been treated as separate sub-species. No authority has forced on them the law for reproductive isolation as a measure to maintain genetic diversity. Then why, scientifically speaking, a different standard for animals when man himself is an animal?

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## **A philosophy for integration of ayurveda with modern medicine: A biochemist's perspective**

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Ayurveda – wisdom of life – the Indian traditional medicine, is a science developed mainly by the experience and wisdom of our ancestors. As against this, modern medicine (allopathy) is a recently developed, experiment-based science of well-defined chemicals with known mechanisms of action, and possible side effects and toxicity. As the former is experience based and the latter is experiment-based, the former is regarded as arbitrary and the latter as a more exacting science and hence has wider acceptance. Therefore, there is a need to put ayurveda on a firmer

scientific footing and to reap its full benefits integrating with modern medicine.

To the human body all medicines are just chemicals/molecules. Living organisms are unique in that they are self-replicating, self-adjusting, self-repairing and self-evolving systems. The human body is dynamic. All the molecules in our body are being continuously replaced by new molecules from the food that we eat. There are over 40-odd constituents (essential vitamins, amino acids, fatty acids and minerals) that are a must in our daily

food for this process. Only when proper molecules are supplied through our food in ample measures day after day, can one expect that a healthy body will be built and sustained. Medicines are secondary to health; vital nutrients in food are primary to health.

According to the second law of thermodynamics, cosmic force drives the universe towards increase in entropy. Life is order and death is disorder. 'Life is defeating entropy and death is victory of entropy, which is more natural'. Hence life is a miracle and aging, disease and